their efficiency when used in a steam-boiler plant. Some of the lignites from undeveloped, but extensive, deposits in North Dakota and Texas showed unexpectedly high power-producing qualities, and it is shown that certain of the dry, non-coking, bituminous coals and semi-anthracites, which are now almost wasted, can be converted into useful fuel by briquetting. The work of the chemical laboratory in connection with the sampling of the coal has undoubtedly set a standard for similar work in the future. The total sum appropriated for the work by the United States Government was 12,000*l.*

The United States Geological Survey has undertaken a far-reaching investigation of all the lead and zinc deposits in the Mississippi valley. A large part of this field has been investigated by the Wisconsin Geological Survey, and an interesting report on the ore deposits, with an atlas of eighteen detailed maps, has been published by Mr. U. S. Grant (Bulletin No. xiv., Madison, Wisconsin, 1906). The results brought out by these maps in regard to the relations and origin of the ore are extremely satisfactory, in that they show that a large portion of the ore deposits are confined to the structural basins.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The voting on the proposed new regulations for the mathematical tripos will take place at a Congregation to be held on Friday and Saturday, February 1 and 2, 1907.

The general board of studies has recommended (1) that a university lecturer in hygiene be appointed, in connection with the special board for medicine, with an annual stipend of 100*l.* payable out of the funds in the hands of the State Medicine Syndicate; (2) that a university lecturer in pathology be appointed, in connection with the special board for medicine, with an annual stipend of 100*l.* payable out of the common university fund.

The general board of studies has approved Mr. E. W. Barnes, Trinity College, for the degree of Doctor in Science.

PROF. M. E. SADLER will distribute the prizes at the Merchant Venturers' Technical College, Bristol, on Thursday, December 20.

LORD MONKSWELL will distribute the prizes and certificates to students at the Borough Polytechnic Institute on Tuesday, December 11, at 8 p.m.

A GIFT having the annual value of 500*l.* a year has been made to the University of Paris by Mr. Andrew Carnegie for scholarships to be awarded for the purpose of carrying on research in the laboratory of Mme. Curie.

A STATUE of the late Principal Viriamu Jones, F.R.S., first principal of the University College of South Wales and Monmouthshire, and the first senior Vice-Chancellor of the University of Wales, was unveiled at Cardiff, on December 1, by Viscount Tredegar.

A DEPUTATION from the executive of the Association of Education Committees was received by Mr. Birrell at the Board of Education on November 29. The deputation sought to obtain more elasticity in the local development of higher education, greater freedom for local education authorities in the training of teachers, and increased Imperial aid for the relief of education rates. Mr. Birrell, in reply, expressed his sympathy with the ideals and most of the objects of the association, and his regret that the Treasury could not authorise him to promise at present any further grant of public funds in relief of local education rates.

AN unusually interesting and important Blue-book (Cd. 3255) has just been issued by the Board of Education. It deals with statistics of public education in England and Wales for the years 1904–5–6. Every grade of school is dealt with, and it is now easy to trace the growth of educational enterprise in recent years. One of the numerous sections is devoted to technical institutions, that is, as defined by the regulations of the Board, to institutions giving organised courses of instruction in day classes. In 1904–5 twenty-three such institutions only were recognised; 2509 students attended them at some time during the year, grants amounting to 8542*l.* were paid on 1295 students attending a full course of instruction, and 1507*l.* on 489 students attending part only of a course. Small as these numbers are, it is satisfactory to find they are larger than the corresponding figures for 1903–4. These students were taught by 416 teachers, of whom nine were women, numbers representing an increase of 108 in the teaching staff in the year. The average age of the students attending these classes was rather low. Of the total number of students, under 300 were women and girls; 1136 were between fifteen and eighteen years of age, 879 between eighteen and twenty-one, and 494 were more than twenty-one years of age. Courses of work in engineering and in applied chemistry were most numerous. During 1904–5 the number of evening schools recognised reached 5706, and the number of students who attended at any time during the year 718,562; a grant was paid on 487,699 of the total number of students. The amount of the grant reached 320,762*l.* Of this total number of students as many as 155,938 were under fifteen years of age, and 202,707 were more than twenty-one years. Two-thirds of the students were men or boys. This Blue-book will prove indispensable to educational administrators everywhere.

THE scholarships, medals, and prizes gained by candidates at the examinations of the London Chamber of Commerce were distributed on November 30 by Mr. Asquith, Chancellor of the Exchequer, who subsequently delivered an address. After referring to the growth of the educational work of the Chamber of Commerce, Mr. Asquith said that men and women of all classes and schools of opinion must agree in feeling gratification that during the last twenty or thirty years we have by our continuation classes, by our technical classes, by our polytechnics, been endeavouring, at any rate, to superadd to the common basis of education which was the possession, or ought to be the possession, of all classes of the community, some means of equipping men and women for the special exigencies of the particular branches of their profession in life. The English people, who have some very excellent qualities, have some ingrained and almost ineradicable superstitions. All agree that in the case of what are called the learned professions some kind of special training and knowledge is needed before a man takes upon himself the pursuit of his calling in them, but every Englishman thinks he is perfectly qualified to take up without any preliminary training the work of business. But, Mr. Asquith continued, we cannot now take things in the easy-going and the happy-go-lucky fashion that we used to do. The strain of foreign competition presses upon us in every walk of business and every market in the world, and, whatever are the contributory causes of the pressure which we all in a greater or less degree experience, there is not a man acquainted with the facts who will not agree that in the case, at any rate, of some of our most formidable competitors—for instance, Germany and the United States—one of the great sources from which they have derived exceptional strength in their commercial and industrial struggle with us has been the superior development of their technical and educational system.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 21.—"The Action of Radium and Certain other Salts on Gelatin." By W. A. Douglas **Rudge.** Communicated by Prof. J. J. Thomson, F.R.S.

The author has completed his experiments on the above subject, following the method first described in NATURE (vol. lxxii., p. 631). A "growth" which appears cellular in structure is seen to occur when a radium salt is put in contact with gelatin. This growth is traced to the formation of an insoluble precipitate of barium sulphate, owing to the barium always associated with radium salts and the sulphuric acid usually present in commercial samples of gelatin. Specially prepared gelatin containing no sulphuric acid gives no growth.

A sample of gelatin from which the sulphuric acid had been removed was sealed up with some radium salt in September last, and at the present time no signs of growth have made their appearance, but if to a portion of the gelatin a soluble sulphate is added, a growth at once appears.

A series of photographs has been taken by means of the large photomicrographic apparatus of Zeiss, using magnifying powers of from 400 to 4000 diameters.

It thus seems to be quite clear that the cellular growth cannot be produced by radium or barium unless a sulphate is present, and other metals, save Sr and Pb, fail to produce any result, because they do not form insoluble sulphates.

The cellular form of these precipitates is probably due to the circumstance that the gelatin is liquefied by the actions of the salt, and each particle of precipitate is formed about a core of gelatin, so that the layer of barium sulphate forms a kind of sac or cell which is surrounded by the solutions of the salt in the liquefied gelatin. This *cell* may be permeable to the liquefied gelatin containing a salt in solution, which, passing through the cell wall, causes an expansion to take place, the limit of growth being controlled by some surface-tension effect.

The conclusions which are drawn from a study of the photographs and direct examination under the microscope with high powers are that:—

(1) The cells form round a precipitate of an insoluble sulphate, and the energy of the growth of the cell depends upon the amount of sulphate present.

(2) *Radium has no specific action in forming cells*, any effect produced being due to the barium associated with it, and the purer specimens of radium salts are less satisfactory as cell-formers than the impurer ones. Probably pure radium salt would have no action except that of causing an evolution of gas.

(3) The cells do not divide or bud, or show anything resembling "karyokinesis," their growth very quickly reaches a maximum, and they do not decay or split up, save as a consequence of the drying of the gelatin. If the cover glass is sealed down with cement, the cells have been observed to suffer no alteration in the course of four months.

(4) Radio-active substances, unless they contain barium, do not give rise to the formation of cells.

November 1.—"The Anæsthetic and Lethal Quantity of Chloroform in the Blood." By Dr. George A. **Buckmaster** and J. A. **Gardner.** Communicated by Dr. A. D. Waller, F.R.S.

The amount of chloroform present in the arterial blood of animals at various stages of anæsthesia has been accurately determined by the authors for the first time in this country. All observers who have worked at the question of chloroform-anæsthesia, including those members of the Special Chloroform Committee of the British Medical Association who have specially investigated this point, are agreed that chloroform is tenaciously held by blood, and that the transport of the drug from alveolar air to the cells of the body and the nervous system is probably effected by the red corpuscles.

The authors have given in some detail an account of the researches recently undertaken by French observers, J. Tissot and Mansion, and M. Nicloux, who have improved on the original methods employed by Gréhant and Pohl by using the reaction described by Dumas in 1821. To ascertain the amount of chloroform in blood, this is distilled off from the liquid, boiled with alcoholic potash, and the potassium chlorate thus obtained is titrated with silver nitrate.

In the experiments now described, the amount of chloroform in arterial blood at the moment when both the conjunctival and tail reflexes have disappeared, when the respiratory movements cease, and when the reflexes reappear, has been calculated from the difference in the chlorine-content of the blood before and after the administration of the anæsthesia. The method of estimation was the well-known one introduced by Carius for determining the amount of halogen in organic compounds, and by the adoption of Gooch's method of filtration and J. P. Cooke's suggestion of washing the silver chloride precipitate with water containing a little silver nitrate, a very high degree of accuracy was obtained. For the validity of this method the natural chlorine-content of the blood must be shown to remain constant during the course of any single set of experiments. Several tables show that this is the case during prolonged anæsthetisation with ether, the actual deviations from the mean being only 0·00123 and 0·00165.

The majority of the observations have been made on cats, since the phenomena of anæsthesia in these animals closely resemble those observed in man. In order to afford a means of comparison with the results obtained by the French observers on dogs, a few experiments were carried out on these animals.

Since it is difficult in any given case to ascertain the exact moment when an animal is actually anæsthetised, the authors have been obliged to take the disappearance of both conjunctival reflexes as a fixed point, and the occurrence of the first asphyxial convulsion of the respiratory muscles as indicative of the lethal stage, and in order to obtain comparable results they have found that the experiments must be made on healthy, well-nourished adults, and that the animals must not be in full digestion.

From the results of all the experiments it has been found that the amount of chloroform in arterial blood at the moment when the conjunctival reflexes disappear varies between 14 and 27·6 milligrams in 100 grams of blood. As others have noticed, the rate of induction of anæsthesia varies slightly in different animals, though the actual body-weight is a negligible factor. The curves given in the paper, which have been constructed from the varying chloroform-content of the blood during anæsthesia, show that the rate of induction is a feature peculiar to each individual animal. The average lethal dose of chloroform in 100 grams of blood is 40 milligrams.

After anæsthesia the chloroform is eliminated with extreme rapidity, and though the rate of elimination varies in different animals, the rate of disappearance of chloroform is far more constant than the rate of assumption.

A considerable number of experiments devised to ascertain how chloroform when inhaled is distributed in the red corpuscles and plasma, show that the drug is primarily associated with the corpuscles, and only gets into the plasma when the anæsthesia is pushed to an extreme point or a high percentage of the vapour is rapidly administered. From the results given in Table xvii. it appears that no less than 98·5 of the total chloroform in the blood was held by the corpuscles at the moment when the respiration ceased.

The view of Desgrez and Nicloux that carbon monoxide is formed in the blood during intense chloroform-narcosis has not been verified by the few observations which were made to determine this particular point.

November 8.—"Experimental Investigation as to Dependence of Gravity on Temperature." By L. **Southerns.** Communicated by Prof. W. M. Hicks, F.R.S.

The object of this investigation is to determine whether the action of gravity on a given mass varies to any measurable extent when the temperature of the mass is altered. Experiments having the same object, but differently carried out, were described by Poynting and Phillips in the Proceedings of the Royal Society, September, 1905, about a year after the commencement of the present work. These led to a null result, which receives confirmation from the experiments here noticed.

The apparatus in its original form was constructed several years ago by Dr. Hicks. After some modification it was set up in the new university buildings at Sheffield. A mass of paraffin oil was used in the experiments. This was contained in an air-tight, jacketed calorimeter, and suspended from one end of the beam of a balance, the other end carrying a suitable counterpoise. A coil of fine platinum wire was immersed in the oil, and by passing through this an alternating current, the temperature of the oil could be raised to the required degree. In order that this might be accomplished while the balance was freely suspended on its knife-edges, the current was conveyed to the coil by means of two wires rigidly fixed to the beam, their ends being pointed and made just to dip into mercury cups which were placed in line with the central knife-edges, and were joined up to the external circuit. The connections between the wires and the coil leads consisted of thin strips of tinfoil. The error caused by the expansion of these wires due to the passage of the current was negligibly small. The balance was enclosed in a partially exhausted box, the weighings being carried out under a pressure of from 1·6 cm. to 5 cm. of mercury.

The experiment consisted in observing (by means of telescope and scale, and a mirror attached to the beam) the equilibrium position of the beam before heating the mass of oil, and noting any deflection of the same which might occur during and after the passage of the heating current. Only very minute, transient deflections were obtained, and as these did not persist it was evident that they could not be due to actual alterations of weight due to rise of temperature. The results seem to show that no variation of weight greater than 1 in 10^8 occurs during an increase of temperature of 1° C. for the substance used in the experiments.

Geological Society, November 7.—Sir Archibald Geikie, Sec.R.S., president, in the chair.—The Upper Carboniferous rocks of west Devon and north Cornwall: E. A. Newell **Arber.** After a reference to the previous work in the area, the author gives a description of the coast-sections, which display a highly-disturbed sequence of Upper Carboniferous rocks. Special attention is paid to two lithological types: the Carbonaceous rocks, which contain inconstant and impersistent beds of the impure, smutty coal, known locally as "culm"; these beds have yielded plant-remains; and the Calcareous rocks, partly of marine and partly of fresh-water origin, consisting of well-marked, impersistent bands of impure limestone, and conglomeratic beds of calcareous nodules embedded in shales. One of the limestone-bands, the Mouthmill Limestone, is marine, and contains an abundant fauna, while in others the only fossils are *Calamites suckowi* and *Alethopteris lonchitica.* Two distinct and unmingled faunas are present in the rocks: one consists of fresh-water lamellibranchs, and the other of marine fishes, cephalopods, and lamellibranchs, and the evidence as to horizon obtained from them agrees with that yielded by the plant-remains.—The titaniferous basalts of the western Mediterranean: Dr. H. S. **Washington.** In 1905 the author visited the volcanic districts of Catalonia, Sardinia, Pantelleria, and Linosa. He recognises the existence in this region of a hitherto unrecognised petrographic province, in which the basalts contain a remarkably high percentage of titanium. The rocks are of Tertiary age. Labradorite, augite, and olivine are the essential minerals, with titaniferous magnetite and apatite, and in some cases subordinate nepheline. The extent of the region is as yet problematical, and the author points out that along the southern coast of France there are several "basaltic" volcanoes, and it is possible that these may eventually turn out to be connecting links between the rocks of Sardinia and those of Catalonia, or possibly extrusion southward is indicated by the occurrence of phonolite at Maid Gharian, near Tripoli.

Royal Astronomical Society, November 9.—Mr. W. H Maw, president, in the chair.—Account of recent work at the Royal Observatory, Cape of Good Hope, Sir D. **Gill.**—The systematic motions of the stars: A. S. **Eddington.** The author's conclusions supported Kapteyn's hypothesis that there exist two drifts of stars; one drift moves relatively to the sun with a speed between three and four times that of the other, and the numbers of the stars in each drift are nearly equal.—The irregular movement of the earth's axis of rotation: a contribution towards the analysis of its causes: Prof. J. **Larmor** and Major E. H. **Hills.** The movement of the earth's axis of rotation is compounded of a "free precessional" period of 428 days, with irregular disturbances superimposed. The authors give a graphical method of setting out the direction and magnitude of the forces giving rise to the irregular disturbance, and hence arriving at its cause. The curve representing the movement of the pole about its mean position is first referred to an axis revolving in a period of 428 days. The hodograph of the derived curve is constructed, and this is transferred into the corresponding hodograph referred to axes fixed in the earth. The last curve then becomes a "torque diagram," showing in direction and relative magnitude the couple or torque acting upon the earth's axis at any date which would account for the observed motion of the pole. The forces to which these torques are due may be either internal or external transfer of material on the earth, the latter being in the form of change of ocean level, melting of polar ice, earthquake disturbances, or changes of barometric pressure. A numerical estimate of the possible amount of shift due to these various causes was given.—The distribution of energy in the continuous spectrum. The resolving power of spectroscopes: E. T. **Whittaker.**

Physical Society, November 9.—Prof. J. Perry, F.R.S., president, in the chair.—Exhibition and description of apparatus for students' practical work in physics: G. F. C. **Searle.**

PARIS.

Academy of Sciences, November 26.—M. H. Poincaré in the chair.—The determination of the integrals of certain partial differential equations by the values of the normal differential coefficients along a contour: Émile **Picard.**—The alcoholysis of cocoa butter: A. **Haller** and M. **Youssoufian.** Three kilograms of cocoa butter were submitted to the action of methyl alcohol in the presence of either hydrochloric or phenylsulphonic acid, and the methyl esters separated by fractional distillation under reduced pressure. The methyl esters of caproic, caprylic, capric, lauric, myristic, palmitic, stearic, and oleic acids were separated and identified. Butyric acid was carefully searched for, but not found.—Some remarks on the observations of contacts in total eclipses of the sun: Ch. **André.** It is shown that the perfect concordance between the times observed at the same place for the same contact by two different observers does not prove that this result is the real time of contact. A correction is necessary, depending on the observer and the aperture employed.—The history of the principle employed in statics by Torricelli: P. **Duhem.**—An improvement in the eudiometer: its transformation into a grisoumeter. Detection and estimation of methane and carbon monoxide: Nestor **Gréhant.** The fine platinum wire, first introduced by Coquillion as a means of combustion of gases, is fitted to the graduated tube by means of a rubber cork. The wire is heated to redness from two to six hundred times. In a 1 per cent. mixture of methane and air, 0·92 per cent. was found by this improved method, or an accuracy of 92 per cent. of the amount present.—The determination of the geographical coordinates of Tortosa and of the new Ebro Observatory: R. **Cirera.**—Partial differential equations of the second order with two independent variables admitting a group of even order of transformations of contact: J. **Clairin.**—The integration of differential equations: J. **Le Roux.**—The electrical conductivity of selenium: Maurice **Coste.** From the point of view of electrical conductivity, light produces the same effect on selenium as a rise of temperature. A specimen of selenium possessing a large residual conductivity is insensible to the action of light.—A mode of preparation of hydrated hypovanadic acid: Gustave **Gain.** Ammonium metavanadate is gently ignited at a low temperature, and the resulting mixture of V_2O_3 and V_2O_4 placed in a stoppered flask with an excess of saturated sulphurous acid solution. The blue solution thus obtained is submitted to prolonged ebullition, when the acid H_2VO_3 is deposited.—The elements producing phosphorescence in minerals. The case of chlorophane, a variety of fluorspar: G. **Urbain.** By converting the fluoride into oxide, and examining the kathode spectrum of the phosphorescent line thus obtained, traces of the rare earths, including samarium, terbium, dysprosium, and gadolinium, have been detected.—The oxide-ethers of glycollic nitrile: Marcel **Sommelet.**—The transformation of cinnamic alcohol into phenylpropylene and phenylpropyl alcohol by the metal-ammoniums: E. **Chablay.** The metal-ammoniums reduce cinnamic alcohol in a similar manner to the unsaturated fatty alcohols, giving the corresponding hydrocarbon, and according to the same mechanism; but the yield is very poor, the principal reaction being the production of phenylpropiolic alcohol.—A method of preparing the oxynitriles $ROCH_2CN$: D. **Gauthier.** The monochlor-ethers, $R.O.CH_2Cl$, are readily prepared by Henry's method, the reaction of hydrochloric acid upon a mixture of the alcohol, ROH, and formaldehyde in aqueous solution. The chlorine atom in these compounds is readily exchanged for the cyanogen group by treating with mercury, or, better, cuprous cyanide. An account is given of the preparation and properties of several nitriles by this method.—Vicianine, a new cyanogenetic glucoside contained in vetch seeds: Gabriel **Bertrand.** Full details are given of the method adopted for extracting the glucoside from the seed. Vicianine contains 3·2 per cent. of nitrogen, the whole of which is set free as hydrocyanic acid by the action of emulsin.—Cytological observations on the germination of the seeds of Gramineaceæ: A. **Guilliermond.**—The concentration of chlorophyll and assimilating energy: W. **Lubimenko.**—A disease of *Abies pectinata*, accompanied by a reddening of the leaves: L. **Mangin** and P. **Hariot.** Several species of fungi were found on the infected leaves, and it is not yet clear to which of these the disease is due. To settle this point, inoculation tests with the various spores isolated will be carried out in the Cryptogam garden.—The culture of the artificial cell: Stéphane **Leduc.** Experiments on the structures formed by a grain of copper sulphate placed in an aqueous solution containing from 2 per cent. to 4 per cent. of potassium ferrocyanide, 1 per cent. to 18 per cent. of sodium chloride or other salts, and from 1 per cent. to 4 per cent. of gelatin. The granule becomes surrounded by a membrane of copper ferrocyanide, permeable to water and certain ions, but impermeable to sugar. It is shown that the products of growth of these artificial seeds are sensitive to all chemical and physical actions. The growth is arrested by numerous poisons, and the direction of growth is determined by differences of temperature and osmotic pressure.—The action of *Eriophyes passerinae* on the leaves of *Giardia hirsuta*: C. **Gerber.**—The *rôle* of olefaction in the recognition of ants: H. **Piéron.**—Experimental researches on thermal troubles in cases of absolute privation of sleep: N. **Vaschide.** The privation of sleep induces a constant and sensible lowering of the body temperature. The first physiological effect of sleep is to restore the thermal equilibrium of the organism.—The physiological *rôle* of the yellow pigment of the macula: A. **Polack.**—Contribution to the study of the hearing of fishes: M. **Marage.** Fishes do not hear vowel sounds transmitted in the interior of the liquid, even although the energy of the sound is sufficiently great to be remarked by persons regarded as completely deaf.—Experimental researches on the lesions of the nervous centres following on insolation: G. **Marinesco.**

DIARY OF SOCIETIES.

THURSDAY, DECEMBER 6.

ROYAL SOCIETY, at 4.30.—A Comparison of Values of the Magnetic Elements deduced from the British Magnetic Survey of 1891 with Recent Observation: W. Ellis, F.R.S.—The Theory of the Compositions of Numbers, Part ii.: Major P. A. MacMahon, F.R.S.—On the Transpiration Current in Plants: Prof. H. H. Dixon.—The Theory of Photographic Processes, Part iii., The Latent Image and its Destruction: S. E. Sheppard and C. E. K. Mees.—The Chemistry of Globulin: W. Sutherland.

CHEMICAL SOCIETY, at 8.30.—The Liquid Volume of a Dissolved Substance: J. S. Lumsden.—Some Derivatives of Benzophenone; Synthesis of Substances occurring in Coco-bark (preliminary notice): W. H. Perkin, jun., and R. Robinson.—A Synthesis of Terebic, Terpenylic and Homoterpenylic Acids: J. L. Simonsen.

LINNEAN SOCIETY, at 8.—*Papers:* A Contribution to the Physiology of the Museum Beetle, *Anthrenus museorum* (Linn.): Prof. A. Ewart.—Note on the Origin of the Name *Chermes* or *Kermes*: E. R. Burdon.—*Exhibitions:* An Abnormal Specimen of a Dab with Three Eyes: Dr. A. T. Masterman.—A Note on *Siegesbeckia orientalis*, Linn.: Rev. H. Purefoy FitzGerald.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Selection and Testing of Materials for Construction of Electric Machinery: Prof. J. Epstein.

FRIDAY, DECEMBER 7.

GEOLOGISTS' ASSOCIATION, at 8.—The Zones of the White Chalk of the English Coast, Part v.: Isle of Wight: Dr. A. W. Rowe.

AËRONAUTICAL SOCIETY, at 8.—The Use of the Kite in Meteorological Research: Dr. W. N. Shaw, F.R.S.—The Gordon Bennett International Balloon Race: Colonel J. E. Capper.—The Aëroplane Experiments of M. Santos Dumont: E. S. Bruce.—The Stability of the Conic Shape in Kites and Flying Machines: R. M. Balston.—*Exhibit*: A Model of the Santos Dumont Aëroplane, made by the President.

MONDAY, DECEMBER 10.

VICTORIA INSTITUTE, at 4.30.—Review of Prof. Flinders Petrie's "Sinai": The Secretary.

ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—Irrigation in the United States; its Geographical and Economical Results: Major John H. Beacom.

SOCIETY OF ARTS, at 8.—Artificial Fertilisers: Phosphatic Fertilisers A. D. Hall.

TUESDAY, DECEMBER 11.

ZOOLOGICAL SOCIETY, at 8.30.

INSTITUTION OF CIVIL ENGINEERS, at 8.—*Discussion:* The Talla Water-supply of the Edinburgh and District Waterworks; Repairing a Limestone-concrete Aqueduct: and The Yield of Catchment Areas.—*Probable Paper:* Mechanical Considerations in the Design of High-tension Switchgear: H. W. E. Le Fanu.

FARADAY SOCIETY, at 8.—(1) On the Electrochemistry of Lead; (2) Contributions to the Study of Strong Electrolytes: Dr. A. C. C. Cumming.—Storage Batteries and their Electrolytes, Part ii.: R. W. Vicarey.

WEDNESDAY, DECEMBER 12.

SOCIETY OF ARTS, at 8.—Fruit Growing and Protection of Birds: Cecil H. Hooper.

THURSDAY, DECEMBER 13.

ROYAL SOCIETY, at 4.30.—*Probable Papers:* On the Intensity of Light Reflected from Transparent Substances: Prof. R. C. Maclaurin.—Contributions to our Knowledge of the Poison Plants of Western Australia, Part ii., *Oxylobium parviflorum*, Lobine: E. A. Mann and Dr. W. H. Ince.—Experiments on the Length of the Kathode Dark Space with Varying Current Densities and Pressures in Different Gases: F. W Aston.—An Examination of the Lighter Constituents of Air: J. E. Coates.—Further Observations on the Effects produced on Rats by the Trypanosomata of Gambia Fever and of Sleeping Sickness: H. G. Plimmer.

SOCIETY OF ARTS, at 4.30.—The Indian Mohammedans: their Past, Present, and Future: A. Yusuf Ali.

LONDON INSTITUTION, at 6.—Tadpoles—a Study in Embryology: Dr. J. W. Jenkinson.

MATHEMATICAL SOCIETY, at 5.30.—On the Form of the Surface of a Searchlight Reflector: C. S. Jackson.—The Potential Equation and Others with Function given on the Boundary: L. F. Richardson.—On the Limits of Real Variants: J. Mercer.—The Asymptotic Expansion of Integral Functions defined by Generalised Hypergeometric Series: Rev E. W. Barnes.—The Diophantine Equation $x^n - Ny^n = z$: Major P. A. MacMahon.

FRIDAY, DECEMBER 14.

PHYSICAL SOCIETY, 7 p.m. to 10 p.m.—Second Annual Exhibition of Electrical, Optical, and other Physical Apparatus.

ROYAL ASTRONOMICAL SOCIETY, at 5.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Mechanical Improvements in the Drainage of the Bedford Level: A. Carmichael.

INSTITUTION OF MECHANICAL ENGINEERS, at 8.

MALACOLOGICAL SOCIETY, at 8.—Description of *Latirus* (*Peristernia*) *Sowerbyi*, sp.n.: J. Cosmo Melvill.—On the Anatomy of *Tagelus gibbus* and *T. divisus*: H. H. Bloomer.—Descriptions of two New Helicoid Forms from German New Guinea: J. H. Ponsonby.

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